NG911 Clearinghouse Android ELS Pilot Project

Testing the impact of delivering Android Emergency Location Service (ELS) to PSAPs in the U.S. via the RapidSOS NG911 Clearinghouse

January 2018
“Why can Uber find me but 9-1-1 can’t?”

Apps like Uber locate users with device-based hybrid location, whereas current E911 location services typically use a network-centric approach that often falls back to cell-tower triangulation when a GPS fix cannot be obtained (such as when the caller is located indoors).

With many 9-1-1 Centers across the country now receiving 80+% of their calls from wireless devices, and with citizens expecting 9-1-1 to be able to locate them just as their Uber can, it is imperative that 9-1-1 can receive the most accurate location available during an emergency.

This case study demonstrates what’s possible when modern smartphone location services meet Next Gen 9-1-1. RapidSOS tested Android Emergency Location Service (ELS) with the NG911 Clearinghouse to examine the potential to more quickly and more accurately determine the location of wireless 9-1-1 calls.

At a Glance: Key Findings

Key Finding 1
ELS through the NG911 Clearinghouse was more accurate and faster than traditional E911 location.

Key Finding 2
PSAPs successfully received Android ELS supplemental location from the NG911 Clearinghouse, integrated into their existing software.

Key Finding 3
This location technology was used during real emergencies, saving lives.
Call-Taker Feedback: We’re Ready to Go!
Call-Takers Embrace Technology to Locate Callers
Majority of Call-Takers Noticed the Availability of Device Location & Found It Useful
NG911 Clearinghouse Is Integrated into Existing Call-Taking/Dispatch Software

Examples Show: Lives Are Saved
Real-Life Examples: Collier County, FL
Real-Life Examples: Loudon County, TN
Real-Life Examples: NCTCOG, TX

Next Steps
Phase 1
Generally not considered "dispatchable location," Phase 1 location is the civic address of the nearest cell tower, or the coordinates of the cell tower or sector centroid.

Phase 2
Best practice is to use GPS location technology, with network-based mechanisms as a fallback when no GPS is available. While GPS is generally very accurate, it only works reliably in outdoor environments where a clear line of sight to satellites is available. Indoors, GPS will often fail and positioning centers will instead utilize less accurate network-based mechanisms, or fall back to Phase 1.

Even if Phase 2 location is available and accurate, it is often only available after a re-bid, which typically incurs a delay of 25-30 seconds.

DEVELOPMENT

Combines all sensors on the device
- GPS
- WiFi Access Points
- Bluetooth beacons
- Barometric pressure
- Pedestrian dead reckoning, gyro sensors, accelerometers, etc.

"Hybrid" indicates that the device can fuse the different sources together and provide the best location based on context and environment, as opposed to having to choose "either/or" and waiting for one method to fail before trying the next.

Fused or hybrid location utilizes a combination of different methods to validate and determine the most accurate location possible. In indoor environments, the device typically relies on WiFi access points and enhances and validates the location with other mechanisms, whereas in outdoor environments the device typically relies heavily on GPS. In all cases, location is cross-referenced across sources to make it more robust and reliable.
Inaccurate & Slow Location Data Impacts Call-Takers

Survey of call-takers and dispatchers from participating agencies.

In your role, what are the negative impacts of inaccurate or slow location data?

“Sometimes it could mean that we don’t find the person who needs help until it is too late. At best slow location data delays response to a minor event. At worst it could mean someone loses their life.”

The results of the pilot showed the positive impact that improved location accuracy and speed of delivery can have on the outcome of wireless 9-1-1 calls. To better understand how this actually impacts the day-to-day jobs of 9-1-1 call-takers, an extensive survey and interviews were conducted to measure satisfaction and receive feedback from an operational perspective.
In January 2018, RapidSOS and Google conducted a pilot project to evaluate Android ELS location accuracy and speed of delivery for wireless 9-1-1 calls. Three test regions participated in the pilot project and ELS location was captured via the NG911 Clearinghouse and transmitted for a fraction of 9-1-1 calls received in the pilot PSAPs.

**Key Findings:**

1. ELS through the NG911 Clearinghouse was more accurate and faster than traditional E911 location.
2. PSAPs successfully received Android ELS supplemental location from the NG911 Clearinghouse, integrated into their existing software.
3. This location technology was used during real emergencies, saving lives.

**Wireless Location Solution:**  
Android ELS meets NG911 Clearinghouse

**Android ELS**  
Device-Based Location Source

99% of Android devices (version 4.0 and upwards) support Android Emergency Location Service (ELS) – an Android service that transmits a more reliable emergency location both indoors and outdoors (by fusing Wi-Fi, GPS, cell tower data, and other sources) to emergency services during a 9-1-1 call.

This service has already been successfully activated in many countries in Europe and the European Emergency Number Association estimates that 7,500 lives and 95 billion euros could be saved if Android ELS is implemented everywhere in the EU.

**NG911 Clearinghouse**  
Location & Data Platform for Public Safety

The NG911 Clearinghouse is a NENA i3 compliant Location Information Server (LIS) and Additional Data Repository (ADR) that is accessible to authorized Public Safety Answering Points (PSAPs) through integrations into all major call-taking, dispatch, and mapping software.

Simply put, the NG911 Clearinghouse integration is an easy way for PSAPs to receive device-based location and enhanced data for smartphone 9-1-1 calls through their existing PSAP software.
January 2018 Pilot Project Objective:
To evaluate the location accuracy and speed of Android ELS compared to existing 911 location systems and demonstrate the ability of the NG911 Clearinghouse to effectively deliver Android ELS data to PSAPs.

- **January 2018**: Data collection period
- Location only collected when within three geofenced areas of the pilot regions
- Location only delivered to call-takers when within PSAP jurisdiction

**Participating Public Safety Agencies:**

**North Central Texas Council of Governments (NCTCOG)**
- 44 PSAPs
- Population: ~2 million
- Morphology: Urban/suburban

**Loudon County, TN**
- 1 PSAP
- Population: ~50,000
- Morphology: Rural

**Collier County, FL**
- 2 PSAPs
- Population: ~350,000
- Morphology: Suburban

*Note: Plots depict the cumulative number of calls in each spatial region for the entire time range.*
NG911 Clearinghouse Integration Partners
PSAPs can access the NG911 Clearinghouse via integrations into their existing call-taking, mapping and dispatch software. More integration partners are always being announced; check [here](#) for more details.

Primary Wireless Location Delivery through the ALI/E911 Mechanism:
Complicated process largely based on landline paradigm, typically rebid required

Supplemental Device Location Delivery through the NG911 Clearinghouse:
Designed from the ground up for Wireless & NG911, delivers immediately and updates automatically
Key Finding 1

ELS through the NG911 Clearinghouse was more accurate and faster than traditional E911 location.

“During a 911 call to report a crash the caller was unaware of their exact location on a main roadway. I received Phase 2 but it wasn’t consistent with what the caller was describing. Prior to reviewing or obtaining Phase 2 I had a RapidSOS response and the location was dead on where the caller was in need of assistance.”
Test Results: Reported Location Accuracy

To compare location accuracy between ELS and the ALI, uncertainty data was captured. The results show that ELS via the NG911 Clearinghouse provides more accurate location data than the ALI.

76% Reported Uncertainty <50 meters
ELS reported an uncertainty of 50 meters or less for 76% of calls.

On average, significantly lower uncertainty radius

Average Reported Meters Uncertainty (best in call)
The pilot data demonstrates how ELS location, delivered via the NG911 Clearinghouse, gets more accurate location data to the call-taker’s screen faster than Phase 2. This is driven by two main factors:

1) **ELS is calculated directly on the device, instead of in the wireless network**

A precise location may already be available on the smartphone before the 911 call, and if necessary calculation starts immediately when the call is placed.

2) **The Clearinghouse uses IP-based delivery mechanisms, instead of legacy ALI databases**

There’s no need to wait for a Phase 2 re-bid, requests are returned in milliseconds, and location is updated periodically.

Test Results: Speed of Delivery

To compare speed of delivery between ELS and the ALI, availability of ELS location was compared to the availability of Phase 2 location to the call-taker. The results show that ELS via the NG911 Clearinghouse typically arrives 25-30 seconds faster than the Wireless Phase 2 location.
Key Finding 2

PSAPs successfully received ELS supplemental location from the NG911 Clearinghouse, integrated into their existing software.

“This technology needs to be widely available.”

“This technology will be an amazing addition to the technology we use daily as 911 dispatchers and will greatly reduce the amount of time it takes to get an accurate location for a caller.”
Location Delivery: Collier County, FL

The NG911 Clearinghouse integrates with any call-taking, dispatch, and mapping software.

During the pilot, Collier County received the supplemental ELS location from the NG911 Clearinghouse via three different software systems: 1) Smart911, 2) VESTA Map Local, 3) VESTA 911.
Location Delivery: Loudon County, TN

Loudon County received the supplemental ELS location from the NG911 Clearinghouse via their Zetron MAX CT, integrated into their CAD Mapping.

Location Delivery: NCTCOG, TX

NCTCOG PSAPs received the supplemental ELS location from the NG911 Clearinghouse via GeoComm’s GeoLynx Server mapping product.

**ZETRON MAX CT / CAD INTEGRATION**

1. ELS location plotted in existing CAD map
2. User can toggle back and forth between ELS location and Phase 2 location

**SOLACOM GUARDIAN / GEOCOMM GEOLYNX**

3. ELS location plotted on existing call-taker maps
4. E911 ALI Phase 2 also displayed
Majority of Call-Takers Noticed the Availability of [ELS-Transmitted] Device Location from the NG911 Clearinghouse and Found It Useful*

Survey of call-takers & dispatchers from pilot agencies; n = 168

82% Have Noticed Device Location via RapidSOS
Have you noticed device-based RapidSOS location information?

88% Found Device Location via RapidSOS Useful
Has it been useful?

83% Found Device Location via RapidSOS to Be More Accurate than Phase 2
When available, has RapidSOS location been more or less accurate than Phase 2 ALI information?

*Call-takers & dispatchers were not informed that ELS location would be available to them during the course of the pilot, but noticed enhanced location on the percentage of calls with ELS location data.
Call-Takers Embrace Technology to Help Locate Callers

Survey of call-takers from participating agencies; n = 168

PSAP Survey Results

"As a 9-1-1 Supervisor I am incredibly pleased with the location information we are getting with RapidSOS."

"With more and more people using cell phones and not having house phones wireless location is very important to 911."

"Location is the most important information we need above all else!"

"It is great to see the advances in technology that will help us give the public better and faster service."

"The faster and better the location, the faster that we can dispatch the call."

"I really like this; it is going to be a great asset."

"For far too long we have had to rely on highly unreliable wireless location data. During this pilot we have been amazed at how accurate the RapidSOS location data has been. Also, it arrives much faster than Phase 2 (and again more accurate). This means time saved which equals lives saved."
I’ve been in 911 for over 20 years and for the longest time we had to tell everyone that there’s nothing we can do about the wireless location challenge, and we had to wait for someone else to fix it.

Being able to see accurate location at the 911 call-taker position, through existing software systems that the call-takers and dispatchers are already used to, has been very encouraging.

With RapidSOS, we can actually take action in the PSAP to improve the safety of our citizens today.

Bob Finney,  
911 Communications Director,  
Collier County Sheriff’s Office
Key Finding 3
This location technology was used during real emergencies, saving lives.

“On a suicide call the location is vital, and this zoomed directly to the house straight away. Worked excellently!”
Real-Life Example: Collier County, FL

The Situation:
911 caller had a traumatic injury that severed two of her fingers. The caller gave an address, WPH2 showed a location a few houses over, and ELS via the NG911 Clearinghouse showed a third location on the other side of the street.

The Response:
1. Responders went to the address given by the caller
2. They were unable to locate the patient and proceeded to the ELS location
3. The ELS location was accurate

The Result:
In the panicked emergency, the caller gave an incorrect location to the 911 call-taker and first responders were unable to locate her. Fortunately, the ELS location was available and accurate – providing first responders with another source of data to quickly locate the caller.

“This is a good example of how valuable having RapidSOS location will be to emergency services”
- Collier County Dispatcher
### Real-Life Examples: Loudon County, TN

<table>
<thead>
<tr>
<th>MEDICAL PRIORITY</th>
<th>FOREIGN LANGUAGE</th>
<th>FASTER CALL TRANSFER</th>
</tr>
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<tbody>
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#### The Situation:

- 911 call for an unresponsive patient
- The caller doesn’t speak for the first minute of the call, and afterwards struggles with English
- Call comes in from outside Loudon County’s jurisdiction

#### The Response:

1. Call-taker confirms ELS location with caller instead of waiting for caller to describe location
2. Call-taker dispatches ALS ambulance immediately
3. Call-taker proceeds to Medical Priority questions and phone instructions as per protocol

Call-taker immediately sees caller’s ELS location, including the apartment number, and is able to dispatch the first unit before getting any verbal information regarding the location or the incident.
Real-Life Examples: NCTCOG, TX

The Situation:
Caller is in a major accident with injuries and verbally provides incident location as XXX St. & Main St. (several miles west from actual incident).

1. Call-taker had location on screen before caller could verbalize address
2. Call-taker was able to confirm location with caller as the ELS location; units were dispatched correctly
3. When Phase 2 was available, call had already been dispatched

The Response:
Officers were able to respond immediately to the right apartment.

Real-Life Examples: NCTCOG, TX

The Situation:
Verbal disturbance in an apartment building. ELS location pinpointed the location down to the exact building in the apartment complex.

911 Call-Taker:
“Are you at XXX and Main? Because I am showing you at a different location...”

Caller:
“I’m not sure of the cross street...”

ELS location came in immediately with the call.

Phase 2 location took 30 seconds to arrive.

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“In my opinion the [ELS location] works great when it comes to apartment complexes - especially the larger ones, because it breaks down the separate buildings. This allows us to send officers to an exact building to check versus a whole complex.”
Next Steps
GET READY TODAY

Follow 3 simple steps to connect your PSAP to the NG911 Clearinghouse:

1. Request your free access credentials from RapidSOS

2. Contact your vendor/service provider to ensure your call-taking/CAD/map is on a RapidSOS-enabled version

3. Start testing with the RapidSOS Beacon tools to become familiar with device-based location
Faster, more accurate location using the NG911 Clearinghouse

Learn more about the NG911 Clearinghouse: www.rapidsos.com/ng911clearinghouse

Learn more about Android ELS: www.crisisresponse.google/els

Get in touch with your regional RapidSOS 9-1-1 Liaison: www.info.rapidsos.com/psap-integration

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Interested in learning more?